

On the Orbit of the Comet of 1683. By Mr. W. E. Plummer, of Mr. Bishop's Observatory, Twickenham. (Note by Mr. Hind.)

The comet of 1683 was first seen by Flamsteed on the 23rd of July, and was assiduously observed at Greenwich until the 5th of September. The original observations are printed in the first volume of the *Historia Cælestis*. Hevelius observed the comet at Dantzic from the 30th of July to the 4th of September, and the particulars of his observations appear in his *Annus Climactericus*.

Halley calculated a parabolic orbit for this comet from Flamsteed's observations, which was published in his *Synopsis of Cometary Astronomy*, and is as follows :—

Perihelion Passage, 1683, July 13, at 3^h 0^m, G.M.T.

Longitude of Perihelion	85° 29' 30"
Longitude of Ascending Node ..	173 23 0
Inclination of the Orbit	83 11 0
Logarithm of Perihelion distance ..	9.748343

Motion Retrograde.

In the fifth volume of the *Astronomische Nachrichten* (No. 117) Clausen (the present director of the Observatory at Dorpat) has given elliptic elements for this comet, founded as he states upon a new reduction of Flamsteed's observations. These elements are as follow :—

Perihelion Passage, 1683, July 12.73236, M.T. at Paris.

Longitude of Perihelion	86° 31' 15"	} Mean Equinox, 1683.0.
Longitude of Ascending Node ..	173 17 48	
Inclination of the Orbit	83 47 46	
Logarithm of Perihelion distance ..	9.7430148	
Eccentricity	0.9832470	

Motion Retrograde.

The period of revolution in this ellipse is 189.8 years, which would bring the comet to perihelion again in 1873.

Mr. Bishop having, on my suggestion, requested Mr. Plummer, assistant in his observatory, to make a new and rigorous reduction of Flamsteed's observations, an accurate Ephemeris of the comet was first calculated for the whole interval between the extreme observations, the Sun's longitudes and the radii-vectores of the Earth, being deduced from the Solar Tables of Leverrier. The places of the comparison stars were carried back, from the Greenwich Catalogue for 1860, undoubtedly the highest existing

authority. The observed distances of the comet from stars were carefully corrected for refraction and parallax, a mean value of the refraction being employed, and the distances in the computation of parallax inferred from Clausen's ellipse. A comparison of the observations thus rigorously reduced with Clausen's orbit was then made, and it was at once evident that an orbit might be found to represent the observations much more satisfactorily than the ellipse in question. This Mr. Plummer proceeded to investigate, and the result is a parabolic orbit which accords as well with the whole course of observations as the limits of their errors will allow. The elements of this parabola are :—

Perihelion passage, 1683, July 13, 09^h06^m38^s, Greenwich M.T.

Longitude of Perihelion	..	..	85° 35' 59.5"	} Mean Equinox, 1683 ^c .
Longitude of Ascending Node	..	173	24 39.7	
Inclination of the Orbit	..	..	83 13 14.7	
Logarithm of Perihelion distance	..		9.7478656	

Motion Retrograde.

The sums of the squares of the errors are :—

		R.A.	N.P.D.
In Clausen's ellipse	..	337278"	224845"
In Plummer's parabola	..	29089"	58394"

It would therefore appear that there is no reason to expect the return of the comet within the next few years, or to suppose that it is one of moderate period.

If I am not greatly mistaken, Clausen has merely reduced Flamsteed's observations on three days, and computed an orbit upon them by a general method, such as that given by Gauss in the *Theoria Motus*. The observations selected are almost indicated by the comparison with his elements.

I should add that the observations of Hevelius were likewise rigorously reduced, but being found greatly inferior to Flamsteed's in point of accuracy, it was considered that no advantage would be gained by employing them in the calculations for the orbit.

It is the intention of Mr. Bishop, to publish the details of Mr. Plummer's investigation in a separate form.

1870, April 7.

Studies on the frequency of Sun-spots, and on their connexion with the Magnetic Declination-variation. By Prof. Rudolf Wolf. (Translation.)

Denoting by *r* the Relative-number for the Sun-spot frequency introduced by me in the year 1850, by *f* the number of days with-